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FIRST OCCURRENCE OF *TECHNITELLA* NORMAN 1878 (FORAMINIFERIDA: ASTRORHIZIDAE) FROM THE EARLY PLEISTOCENE, SANTA BARBARA FORMATION, CALIFORNIA

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Abstract.—*Technitella* sp. is noted in the fossil record of North America for the first time. This occurrence is based on specimens from the Santa Barbara formation, early Pleistocene of California. The test of *Technitella* sp. was composed of both monoaxon and polyaxon sponge spicules.

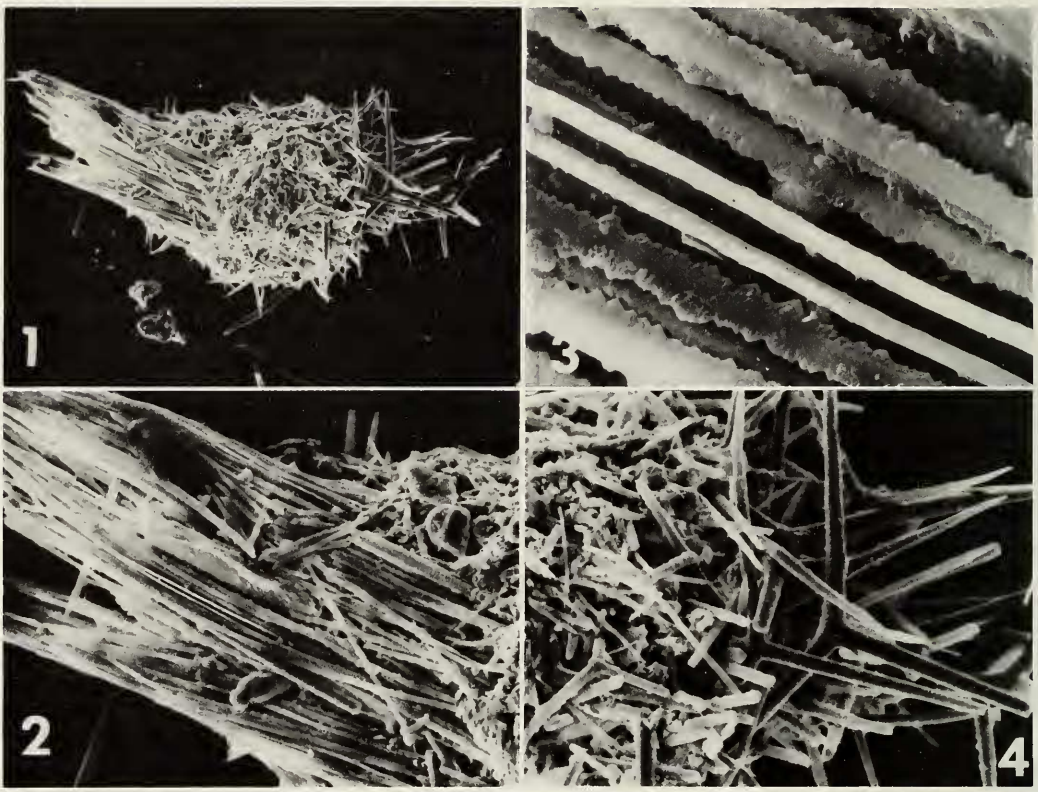
The Bathhouse Beach locality (119°41′38″W, 34°24′23″N) is an exposure of the Santa Barbara formation (early Pleistocene) that forms a high east-facing bluff on the west side of Cabrillo Blvd., Santa Barbara, California. Samples collected from the basal 60 cm of the exposure during August 1970 contained a rich foraminiferal assemblage, including several specimens referrable to the genus *Technitella* Norman 1878. The delicate nature of this form and its rarity in the fossil record warrant documentation of this North American fossil occurrence.

The richly fossiliferous samples comprised bryozoan fragments, small mollusc shells and foraminiferal tests. Occasional echinoderm fragments, crab claws and teleost otoliths were also encountered.

The Bathhouse Beach locality is exceedingly rich in foraminiferal remains, but reports concerning them are few. Loeblich and Tappan (1963) described *Montfortella bramlettei,* and Bullivant (1969) listed seven species (*Trifarina baggi, Cibicides fletcheri, Cibicides gallowayi, Cassidulina limbata, Cassidulina californica, Elphidium translucens,* and *Planulina arminensis*) as common at this locality.

The delicate nature of *Technitella* has rendered it unfavorable for preservation in the fossil record and consequently few occurrences have been documented. Stainforth and Stevenson (1946) described *Technitella archaeonitida* from the upper Eocene-upper Oligocene of Ecuador. *Technitella archaeonitida* was again mentioned from the Eocene of Ecuador by Cushman and Stainforth (1951) and later by Hofker (1956). *Technitella nitida* was noted from the Miocene of Upper Egypt by Stainforth (1949). Colom (1958) reported *Technitella legumen* as occurring frequently in the lower Miocene of Majorca. Dondi and Papetti (1968) also reported *T. legumen* from the lower Pliocene of Italy.

Originally, *Technitella* was described as having an unattached test (Nor-



Figs. 1–4. *Technitella* sp., Bathhouse Beach locality: **1,** 125×; **2,** Anterior section, 324×; **3,** Anterior section, 3000×; **4,** Posterior section, 324×.

man, 1878). Subsequent workers have followed this interpretation. Haman (1967, 1971) however, discovered attached as well as unattached forms of *Technitella* from Tremadoc Bay. Haman (1967) further pointed out that what had been previously described as an aperture was in fact the attachment area, and the aperture was positioned at the opposite end, generally obscured by sponge spicules. Both attached and unattached specimens of *Technitella teivyense* were described from Cardigan Bay by Haynes *et al.* (1973) who commented, "There is no evidence of branching of the cylindrical body chambers in *T. teivyense* so the colonies appear to be composed of separate individuals."

The specific levels of *Technitella* have been defined and differentiated on the basis of the external morphological variations of test size, test shape and degree of test inflation. However, Haman (1967) suggested that these features may represent ontogenetic variations of colonial development. The same author detailed this feature in 1971 along with a corrected emendation of the genus. Postmortem destruction of the colony may result in some specimens appearing to have free unattached tests. In view of the reinterpretation and emendation of *Technitella* by Haman (1967, 1971) it is difficult to evaluate the taxonomic significance of the external morphological differences among the specimens which are known from only unattached tests.

There is considerable variation in the *Technitella* from the Bathhouse beach locality. At present several of these forms are questionable and will be discussed in a later study. *Technitella* sp. (Fig. 1) possesses a subelongate, irregularly oval test covered by both monaxon and polyaxon sponge spicules. The presumed anterior end (D. Haman, personal communication) consists of long, thin, densely packed monaxon spicules (Fig. 2). Some of these roughly parallel, anteriorly projecting spicules are laterally compressed with a series of flattened, subangular serrated edges (Fig. 3). An apertural opening is not discernable, presumably obscured by collapse of the anteriorly projecting spicules. The central area of the test consists of a subspherical mass of agglutinated material and few spicules. The posterior end is composed of large irregularly arranged multiradiate spicules (primarily tetraxon and hexaxon). These spicules are circular or subcircular in cross-section with a minute series of serrations or thorn-like projections along the lateral sides (Fig. 4).

Technitella sp. from the Bathhouse Beach locality differs from *T. legumen* by lacking a subcylindrical test, the absence of a short tubular neck and a rounded attachment area (previously referred to as the aperture). *Technitella* sp. differs from *T. melo* by lacking a spheroidal test composed of long monaxon sponge spicules alligned lengthwise.

Both *Technitella legumen* and *T. melo* have been reported from the North Pacific and Bering Sea (Cushman, 1910; Anderson, 1963). In view of the absence of Recent representatives of *Technitella* from the vicinity of the Bathhouse Beach locality (apparently none recorded within several thousand miles of the locality) and the potential extent of variation reflected in test morphology, formal description of the specific level of the Bathhouse Beach specimens would be premature at this time.

The distribution of *Technitella* is primarily in the temperate, boreal regions of the Arctic, Antarctic, Bering Sea, North and South Atlantic and Pacific Oceans. There are also several records from warm tropical regions. *Technitella* apparently prefer shallow water with minimal wave action or disturbance by currents in a region of slow sedimentation (D. Haman, personal communication).

Preliminary investigation of several samples collected from the Bathhouse Beach locality suggests that there are several micro-environments discernable in this formation and *Technitella* sp. (represented by approximately 100 specimens) may be confined to a narrow range within the Bathhouse Beach locality.

In his evaluation of the paleoenvironmental conditions of the Bathhouse Beach locality, Bullivant (1969:93) stated: "The interpretation that emerges then, is that there was a bank rising to 20–30 fathoms in a region of slow sedimentation. The physical factors of the marine environment were much as they are today although the temperature was perhaps a little lower." This

interpretation is in agreement with the type of environment preferred by *Technitella*.

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